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Clumps of red and white blood cells may contribute to sickle cell disease

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It's long been known that patients with sickle cell disease have malformed, "sickle-shaped" red blood cells – which are normally disc-shaped – that can cause sudden painful episodes when they block small blood vessels.

Now, researchers at the University of North Carolina at Chapel Hill School of Medicine have shown that blood from sickle cell patients also contains clumps, or aggregates, of red and white blood cells that may contribute to the blockages.

The study, published on-line April 18 in the *British Journal of Haematology*, marks the first time that aggregates made up of red blood cells and white blood cells have been found in whole blood from sickle cell patients. The study also shows how the red and white blood cells adhere to one another: the interaction is mediated by a particular protein, integrin alpha four beta one.

First author Julia E. Brittain, Ph.D., a research assistant professor in the medical school's department of biochemistry and biophysics, said further study could lead to new treatments for the disease. "If the blockages are caused by these chunks of aggregates that are circulating in the blood, and we know how the aggregates are sticking together, we potentially could design drugs to disrupt the aggregates so that they pass through the blood vessel more freely," she said.

Normal red blood cells don't interact with white blood cells. But Brittain

first showed in lab tests with isolated cells that young red blood cells (reticulocytes) would interact with white blood cells and form aggregates with them. Then, she looked for such clumps in blood samples from 14 people with sickle cell disease. All the patient samples studied had clumps, though some had only a few, while others had thousands. She didn't see clumps in samples from patients without sickle cell disease.

Brittain said other researchers may have disrupted the aggregates because blood collection tubes usually contain an anticoagulant that ties up calcium, which often plays a role in cell adhesion. She saw the aggregates only when she used an anticoagulant that doesn't remove calcium.

Brittain and her colleagues plan further study of the phenomenon, including the conditions that might determine the number of aggregates in the blood, and whether they are affected by the drug hydroxurea, which is commonly used to treat sickle cell disease.

Source: University of North Carolina at Chapel Hill